# COMPARITIVE STUDY OF PTERYGIUM EXCISION WITH BARE SCLERA WITH INTRAOPERATIVE 0.02% MITOMYCIN-C VERSUS PTERYGIUM EXCISION WITH CONJUNCTIVAL AUTOGRAFT

**BY**

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**Under the guidance of**

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**SHRI B. M. PATIL MEDICAL COLLEGE HOSPITAL & RESEARCH CENTRE, BIJAPUR.**
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Date: **Dr. AKSHATHA.L.CHAVAN**

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# ABSTRACT

**Background and objectives:** Primary pterygium is one of the most common disorders seen in our community because the inhabitants have a high exposure to ultraviolet light. India, a tropical country where heat and dust are an environmental synonym, is an ideal home for pterygium.

But recurrence after excision of pterygium is a common problem and various techniques have been used to reduce its recurrence rates. This study was undertaken to compare the outcome and recurrence rate after excision with bare sclera with 0.02% intraoperative mitomycin C application and conjunctival limbal autograft.

**Methods:**

A prospective study was done which included 45 patients who attended the ophthalmology out patient department of Shri. B.M.Patil Medical College, Hospital and Research Centre during the study period. Patients were selected alternatively and numbered. Patients with even numbers underwent pterygium excision with 0.02% intra operative mitomycin- C application and patients with odd numbers underwent excision with conjunctival limbal autograft. The surgeries were done in Shri. B. M. Patil Medical College, hospital and research centre. All patients were followed up on post operative day 1, day 7, 1 month, 3 months and 6 months for recurrence and possible side effects of mitomycin C and graft complications.

**Results:**

In the patients treated with bare sclera excision with intraoperative 0.02% mitomycin C, 1 case ( 4.5%) had recurrence, in the patients treated with conjunctival

limbal autograft 1 case (4.3% ) had recurrence and 1 patient had sclera thinning following intraoperative 0.02% mitomycin- C.

**Conclusion:**

To reduce the recurrence rate after pterygium excision both the procedures intraoperative mitomycin- C and the conjunctival limbal autograft are eqaully effective methods than bare sclera technique alone.

Although both intraoperative mitomycin- C and conjunctival limbal autograft techniques are equally effective the latter is more safe and cost effective because of lesser complications.

**Key Words:** Pterygium, Ultraviolet Light, Intraoperative mitomycin- C, Conjunctival Limbal autograft, Recurrence.

# LIST OF ABBREVIATIONS

| | | |
|---|---|---|
| BT | : | Bleeding Time |
| BP | : | Blood Pressure |
| CT | : | Clotting Time |
| cms | : | Centimeters |
| IOP | : | Intra ocular pressure |
| LD | : | lethal dose |
| ml | : | mili liters |
| mm | : | millimeter |
| RBS | : | Random Blood Sugar |

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# INTRODUCTION

Pterygium which takes its name from the greek word 'pterygos` meaning "wing of an insect" was described by Hippocrates, Callen and others. Etiology of pterygium is obscure. The prevalence of pterygium has been directly related with proximity to equator: nearer to the equator, the greater the prevalence and to a lesser and milder degree in cooler climates. Most commonly seen on either side of the equator, pterygium has been endemic in the Indian subcontinent, Southeast Asia, Mexico, Caribbean and other places.

Cameron's world map summarises the prevalence rates of pterygium [1].Outdoor work in situations with high light reflectivity, including from sand and water, enhances pterygium development, and the use of hats and sunglasses is protective [2]. It may produce visual impairment, redness, irritation and cosmetic disfigurement.The only effective treatment for pterygium is surgery. However, none of the surgical procedures is perfect and universally accepted because of high recurrence rates. Almost all (91.6%) recurrences appear by 360 days after surgery [3].

The Bare sclera method has a very high recurrence rate of 23% to 75% [4,5,6] . Currently the most widely used techniques are conjunctival autografting and mitomycin C application. Mitomycin C is an an antibiotic-antineoplastic and antimetabolite agent isolated from the fermentation filtrate of Streptomyces caespitosus, inhibits synthesis of DNA and cellular RNA and is a potent inhibitor of fibroblast proliferation.

Kunitomo and Mori were the first to use it in pterygium treatment [7]. Topical mitomycin C applied at the time of surgery appears to be relatively safe [8] and to decrease

the potential toxicity of postoperative applications, although scleral and corneal melting may occur [9].

Both conjunctival autografting and mitomycin- C application are equally effective [10]. Here in this study we compare the outcome, effectiveness and recurrence rates after primary pterygium excision with bare sclera technique with intraoperative mitomycin C application and conjunctival limbal autograft.

## AIMS AND OBJECTIVES

1. To study and compare the recurrence rate after primary pterygium excision with 0.02% intraoperative mitomycin C application and conjunctival limbal autografting.
2. To compare the effectiveness and out come of primary pterygium excision with 0.02% intraoperative mitomycin C application and conjunctival limbal autografting.

# REVIEW OF LITERATURE

**Pterygium**

Word Pterygium is derived from the Greek word meaning "Wing of an insect." Word Pterygium was introduced to English language by Walton in 1875, although it is recognized from ancient times. (Susruta,Hippocrates, Gaka etc )

**Definition:**

Pterygium is a degenerative condition of the subconjunctival tissues which proliferate as vascularized granulation tissue to invade the cornea, destroying the superficial layers of the stroma and Bowman's membrane, the whole being covered by conjunctival epithelium. [11] It is an elastotic degeneration, pterygia stain with Weigert's and Verhoff's elastic tissue stains. But, incubation with the non-proteolytic enzyme elastase produced no evidence of elastolysis.

Many surgical procedures have been described, tried and advocated since the time of Susruta. Celsus, of Rome (1AD) used a scalpel to remove pterygium from the cornea after lifting it from the sclera with a thread passed beneath it. Acrel was the first to perform total removal of the head of pterygium from the cornea and circumscribe it with a bistoury.

It seems that Scarpa in 1802 was the first to perform a kind of Bare sclera excision of pterygium. Later performed by Travers, Westhoff, Bell, Woolhouse and Beer recommended cauterization and scarification of pterygium. Artl successfully closed the conjunctival resection bare sclera area with sutures in an attempt to prevent recurrence.

Weller and Walton transfixed the neck of the pterygium with a thread passed underneath and then cut the corneal attachment and the base of the growth, extirpating the growth.

The Elder Desmarres devised the procedure of transplantation of the pterygium for the purpose of diverting the growth from the cornea into the adjacent lower fornix. He mobilized a small flap of conjunctiva that was sutured between the mobilized pterygium and the corneal margin.

The pterygium atrophied after this procedure and that established a principle used in all transplantation operations. Terrien brought the pterygium growth upward to the upper fornix. Knapp bisected the growth and pulled the upper half superiorly and the lower half inferiorly. Free tissue grafts to cover the bare sclera was introduced in 1876 by Klein. He used mucous membrane grafts in cases in which insufficient bulbar conjunctiva was left after pterygium excision to cover the bare sclera.

Elschnig covered the bare sclera with a pedicle flap conjunctival graft. Autografting with free fragments of conjunctiva was used by de Gama Pinto, Gomez marques and de Paula Xavier.Terson of Paris first referred to the use of radiation treatment after pterygium excision.

The procedure of sub involution was devised by Galezowski in 1880, tried by Numar and named by Bettman in 1894. (It is freeing the head and neck of the pterygium and folding it under the body of pterygium and suturing the edges).

The topical use of mitomycin-C to prevent pterygium recurrence was first described by Kunitomo and Mori in the early 1960s in Japan. Since that time, numerous investigators have reported that topical mitomycin-C is efficacious in decreasing

recurrence rates after pterygium excision.

Rubinfeld et al described the findings in ten patients, who experienced serious, vision threatening complications. These included severe secondary glaucoma (4 patients), corneal edema (3 patients), corneal perforation (1 patient), corectopia (2 patients), iritis (8 patients), sudden onset mature cataract (2 patients), scleral calcification (1) and incapacitating photophobia and pain (8 patients). 6 patients required 20 operative procedures as a consequence of their complications. Intra-operative application of mitomycin-C to the scleral bed has been advocated by many authors since its use has become routine in glaucoma filteration surgery.

Frucht Pery et al compared bare sclera excision with and without intra- operative mitomycin-C (0.2mg/ml) for 5 minutes and found recurrence rates of 4% versus 46.7% respectively, with a mean follow up of approximately 22 months.

**Anatomy of Conjunctiva:**

- Thin, translucent mucous membrane which joins the eyeball to the lids, hence its name.
- Covers the lids posteriorly, and is reflected anteriorly to the sclera from the fornix becoming continuous with corneal epithelium.
- Thus conjunctival sac is exposed anteriorly at the palpebral fissure.
- Normally contains about 7µl of tear film but can accommodate upto 30µl.

**Parts of Conjunctiva:**

1) Palpebral

- Marginal
- Tarsal
- Orbital

2) Conjunctival Fornix

- Superior - reaches orbital margin 8-10mm from limbus
- Inferior - 8mm from limbus
- Medial - medial ends of superior and inferior fornices
- Lateral - 5mm from the surface and 14mm from the limbus, extends just posterior to equator.

3) Bulbar conjunctiva

- Scleral
- Limbal

**Gross Anatomy:**

Conjoin means" to join"

Conjunctiva allows

1) Independent movement of the lids and globe.

2) Provides mucus for lubrication.

3) Contains lymphoid tissue for immunologic response.

The conjunctiva begins at the mucocutaneous junction on the lid margin, posterior to the orifices of the meibomian glands. It is firmly adherent to the lids over the tarsi and loosely attached in the fornices and over the globe except at the limbus.

Approximately 2mm from the tarsal margin is a shallow groove, the subtarsal groove, which marks the transition from the non-keratinized, stratified squamous epithelium of the lid margin to cuboidal epithelium. The superior and inferior fornices are maintained by muscle fibres from the levator palpebrae superioris and inferior rectus respectively.

The total surface area of conjunctiva averages 16sq cm /eye.

Two specialized structures are present medially

1) Plica semilunaris
2) Caruncle

Plica semilunaris (Nictating membrane in frogs) is a fold of conjunctiva that extends from the superior to inferior fornices. It serves as a source of additional conjunctiva to permit lateral rotation of the globe. The caruncle which lies medial to the plica and measures 4x5mm is essentially modified skin tissue. Like skin, the caruncle contains hair, sebaceous glands and sweat glands. Unlike skin, it also contains lacrimal tissue (Krause's glands) and the surface epithelium is not keratinized.

**Microscopic Anatomy**

Like all mucus membranes, the conjunctiva has an epithelial layer and a submucosal lamina propria. Stratified squamous epithelium is present on the lid margin, over the most peripheral 2-3mm of the tarsi and for 2-3mm surrounding the limbus.

The remainder of the tarsal conjunctiva and the forniceal conjunctiva has 2-5 epithelial cell layers, with cuboidal basal cells, cylindrical superficial cells and upto 3 layers of polyhedral cells between them. Goblet cells, which are mucus secreting apocrine cells, can be found in all regions of the conjunctiva. They are most numerous over the tarsi and on the plica and least numerous in the interpalpebral bulbar conjunctiva.

The surfaces of the conjunctival epithelial cells are covered with microvilli and microplicae as well as a thin coating of glycocalyx and mucin. [12] This coating increases the surface area and aids in the attachment of the tear film. The basal epithelial cells are attached to a typical basement membrane by hemidesmosomes, melanocytes may be found among the basal epithelium. The conjunctival stroma consists of two layers, a superficial lymphoid layer and a deeper fibrous layer. The lymphoid layer is made up of a connective tissue matrix containing a homogenous appearing population of lymphocytes. Normally no germinal follicles are present.

The lymphoid layer is not present at birth but begins to form at 6-12 weeks of age.. Deep to this layer is a fibrous tissue layer, through which run the conjunctival vessels and nerves. This layer varies in thickness and is very limited over the tarsus. Two types of accessory lacrimal glands are present in the conjunctiva, Krause's and Wolfring. Their structures are similar to that of lacrimal gland.

Krause's glands are located in the upper fornix and in the caruncle in the submucosal connective tissue. The glands of Wolfring are located in the tarsi, at the upper border of the upper tarsus and the lower border of the lower tarsus.

**Vascular supply:**

Conjunctiva receives its blood supply from the muscular, medial palpebral and lacrimal branches of ophthalmic artery. The medial palpabral and lacrimal branches form the peripheral or marginal arcades of the lids, located between the tarsus and orbicularis muscle. Branches from these arcades pass through the tarsi to the conjunctiva at above the level of subtarsal groove. They supply the entire conjunctiva except for the area lying within 3-4mm of the limbus. The conjunctival capillaries are fenestrous, similar in structure to those found in the choroid.

**Lymphatics:**

Normally no lymphatics are present in the cornea; however the conjunctiva has a rich lymphatic network. The lymphatics arise approximately 1mm from the limbus. Lymphatics in the lateral portions of the conjunctiva drain to the pre-auricular and intraparotid nodes and in the medial portions they drain into submandibular lymph node.

**Innervation:**

Sensory innervations of the conjunctiva is from the ophthalmic division of trigeminal nerve. In general, the nerve supply of the conjunctiva is from the same source as that of the lid, except that the long ciliary nerves innervate the limbal conjunctiva.

The only sensory modality perceived is pain, except for some pressure sensation in the marginal tarsal conjunctiva and the caruncle. Autonomic fibres are also present and are associated with blood vessels.

**Limbus:**

It is a grey semi transparent transitional zone, 1-2mm in width, between the transparent cornea and the white sclera. On the surface it marks the transition from the corneal to conjunctival epithelium, the conjunctiva covering the external limbal surface ends at the periphery of the Bowman's membrane.[13]

It has only 2 layers

1) Epithelium

2) Stroma

It is rich in blood vessels and lymphatics.

**Function:**

1) Provides nourishment to peripheral cornea.

2) Pathway for removal of aqueous humour.

For the histologist, the limbus begins anteriorly at the end of Bowman's membrane and extends posteriorly into the stroma in a concave arc whose deepest posterior extension is adjacent to the middle of schlemm's canal. From here it curves forward and ends close to descemets membrane in the anterior part of trabecular meshwork.

**Pallisades of Vogt:**

The surface of the limbus is marked by radial ridges or folds, known as the Pallisades of Vogt, that lie 1.5mm to 2mm apart and house the blood vessels, lymphatics and nerves. These limbal ridges commence in the corneal epithelium and extend to the limbus at right angles to the peripheral cornea. The pallisades are 0.5mm in

width and 2-4mm long. There are approximately 36 ridges per limbal quadrant. In heavily pigmented individuals, the pallisades are outlined by golden brown pigmentation. More prominent in the lower limbus are attenuated but lengthened superiorly, and are undetectable in horizontal quadrants.

**Clinical Patterns:**

1) Standard pattern - Cylindrical

2) Exaggerated pattern - More wider and pigmented

3) Attenuated pattern - Thin

**Limbal Epithelium:**

- Consists of 8-12 layers of non-stratified squamous cells.
- Superficial layers are similar to corneal epithelium but contain melanocytes and langerhan's cells.
- Basal cells are more cuboidal contain less cytoplasm have undulating extensions of the basal surface into the underlying matrix. Undifferentiated cells are stem cells.

**Stroma:**

Limbal connective tissue is made up of loose irregularly arranged collagen fibres with proteoglycans and soluble glycoproteins. It contains melanocytes, macrophages, mast cells, lymphocytes and plasma cells as well as blood vessels, lymphatics and unmyelinated nerve fibres.

**Blood vessels:**

Are derived from superficial marginal plexus, derived from episcleral branches of anterior ciliary vessels.

**Limbal veins:**

Drain into episcleral veins

Arranged in two nets

1. Deep scleral plexus
2. Intra scleral plexus

**Limbal lymphatics:**

Are limited to the subepithelial connective tissue in the same area as blood vessels. They are divided into three groups.

1. The lymphatic circle of Teichmann, fine lymphatic arcades found in close association with the terminal arcades of the limbal arterial system.
2. The terminal lymphatics, which merge into a system of radial lymphatics that run through the palisades of Vogt deep to the radially disposed arteries and veins.
3. Temporal branches of these radial lymphatics which eventually drain into the pre-auricular lymph node (the nasal branches drain into the submandibular lymph node).

**Anatomy Of Cornea**

The cornea is the transparent, anterior portion of the outer shell of the eye, corresponding to a watch crystal.

Anterior Surface: Horizontal diameter -11.7mm

Vertical diameter -10.6mm

Posterior Surface: Horizontal diameter 11.7mm

Vertical diameter 11.7mm

It is thinnest centrally, averaging about 0.52mm, whereas the periphery is approximately 0.65mm thick. The central one third of the cornea is almost spheric, with an average radius of curvature of 7.8mm (called as optical zone). The peripheral cornea is less curved, but variably so.

The posterior corneal surface is nearly spheric and its radius of curvature has been estimated to be approximately 6.8mm.Using these numbers, the refractive power of the anterior surface of the cornea is +48.8D and the posterior surface is -5.8D. The net refractive power of the cornea, therefore is 43D or 70% of the total refractive power of the eye.

In the newborn the cornea is relatively large, averaging 10mm vertically. Its curvature is also steeper, approximately 51D at birth. The average corneal thickness is approximately 0.585mm and the peripheral thickness averages 0.70 to 0.75mm.

The cornea continues to grow in diameter and flattens with age, reaching close to adult measurements after the first year of life.

**Microscopic Anatomy:**

The cornea consists of 5 layers.

***1) Epithelium:***

- It is stratified, squamous non-keratinized
- Approximately 5 cells deep, it is composed of three types of cells.
  a) Columnar basal
  b) Flat superficial
  c) Polygonal wing
- It is 50μ thick
- The superficial cells lie in 2 layers

On scanning electron microscopy, flat and mostly hexagonal epithelial cells are seen. They exhibit numerous microprojections (microvilli and microplicae) and have an extensive fibrillar glycocalyx or buffy coat, on their surface membrane. The microplicae enhance the adherence of the tear film to the glycocalyx. Tight junctions are present around the entire lateral borders of each cell serving as anatomic barrier to passage of substances into the intercellular space. The wing cell layer is three cells deep; the more superficial the cell, the flatter its appearance. The nuclei of wing cells lie parallel to the surface. The deeply situated basal cells compose a single layer of columnar cells that rest on the basement membrane.

These cells are mitotically active and the daughter cells move anteriorly to become wing cells. Actin filaments are also present which may play a role in cell migration, such as occurs during wound healing. Hemidesmosomes along the basal surface of these cells attach them to basal lamina. Epithelial cells appear to migrate centripetally across the corneal surface. Both basal and wing cells slide toward the inferocentral cornea as well as towards the surface, where desquamation occurs (X-Y-Z hypothesis).[14,15]

**2) Bowman's Layer:**

Bowman's layer is an acellular zone, 8-10μ thick beneath the epithelium. The anterior margin is limited anteriorly by the basement membrane of epithelium and the posterior border merges into the anterior stromal collagen fibres. By electron microscopy, it is seen to consist of randomly arranged, short collagen fibrils. The collagen fibrils are smaller in diameter, approximately 2/3$^{rd}$ that of stromal fibrils. Bowman's layer does not have regenerating capacity.

**3) Stroma:**

Constitutes about 90% of cornea, consists primarily of collagen fibres, stromal cells and ground substance. It contains approximately 78% of water. The collagen fibrils account for about 80% of dry weight of the cornea, the ground substance for about 15% and cellular elements for only about 5% .Collagen fibrils are arranged in 200-300 lamellae parallel to tear surface. The lamellae run parallel to each other and to the surface of cornea, each running the full length of the cornea. Therefore a cross section of the stroma will show some fibrils running nearly parallel to the section and some running nearly perpendicular.

The collagen fibrils of stroma are uniform and small, about 250 to 300$A^0$ in diameter. The fibrils in the stroma are the smallest of those in any tissue in the body, and they show bandings very similar to those of other collagen fibrils. Cross section reveals that individual fibres are composed of several subunits of extremely fine fibrils.

Type-I collagen is the predominant collagen found in the cornea. Type V, Type I comprise 10% and 25% respectively. The collagen is relatively stable with little yearly turnover. The ground substance consists of glycosaminoglycans namely keratan sulphate and chondroitin sulphate in the ratio of 3:1.[16] The keratocyte is the predominant cell of the stroma. On an average there are 2430 keratocytes. Keratocytes are probably derived from neural crest cells and maintain the collagen and extracellular matrix of the stroma.

**4) Descemet's Membrane:**

Descemet's membrane, which is approximately 10μ thick in adults, is a thick basal lamina produced by the endothelium. Schwalbe's ring marks the termination of descemet's

peripherally. On electron microscopy, it is composed of anterior banded and posterior homogenous zones. The anterior zone is produced in utero, beginning at approximately 4 months of gestation. The posterior portion is produced after birth and thickens progressively with age. It contains type IV collagen, type VIII and fibronectin. Peripherally, localized thickenings of descemets membrane, called Hassal- Henle bodies are present in the normal eye. Descemet's membrane regenerates easily after injury.

**5) Endothelium**

A single layer of flat hexagonal cells lies posteriorly on descemet's membrane. On scanning electron microscopy, the normal flat surface cells with sharply demarcated borders can be seen.

The endothelial cells are more cuboidal in shape and about 10μ in height at birth, flatten with age to about 4μ in adults. Endothelium is derived from neural crest cells. The cells density decreases from approximately 3500-4000 cells/$mm^2$ at birth to 2500-3000 cells/$mm^2$ in the adult cornea for a total of about 4 lakh cells. Generally there is no mitotic activity in the endothelium after birth. Some endothelial cells die throughout life, resulting in gradual decrease in the endothelial cell population with age. As cell loss occurs with aging or trauma, the neighbouring cells spread out to cover the vacant areas.

The endothelial cells are capable of preserving function despite tremendous enlargement and generally can maintain corneal function at cells densities as low as 300 to 600 cells/$mm^2$. Histologically these cells exhibit numerous large mitochondria, smooth and rough endoplasmic reticulum, a well developed golgi apparatus and free ribosomes.

There is elaborate interdigitation of the lateral walls of adjacent cells and multiple junctional complexes, including zona occludens, macula occludens and desmosomes.

**Innervation:**

Sensory innervation is supplied by ophthalmic division of the trigeminal nerve by way of long ciliary and possibly the short ciliary branches of the nasociliary nerve. About 70 nerve trunks pierce the cornea at the middle 1/3$^{rd}$ of its thickness. The nerves lose their myelin sheath after transversing 0.5-2mm into the cornea and then continue as transparent axon cylinders.

The nerves find their way beneath the Bowman's layer where they form a dense subepithelial plexus. They then pierce the bowman's membrane to terminate among the epithelial cells as simple axon terminals without specialized sensory organs as free nerve endings.

Sympathetic fibres also innervate the cornea, although their role is unclear. Their cell bodies lie in the superior cervical ganglion, and their axons are carried in the trigeminal nerve. Passing with the sensory fibres to the corneal epithelium. Beta adrenergic receptors are present on cell membranes. Activation of these receptors stimulates transport of chloride from cells into the tears. Muscarinic cholinergic receptors have also been identified in the epithelial cells.

**Vascular supply:**

Cornea is an avascular structure, small loops derived from the anterior ciliary vessels invade its periphery for about 1mm and provide nourishment. Actually these

loops are not in the cornea but in the subconjunctival tissue which overlaps the cornea.

Avulsion of pterygium head from the cornea with a muscle hook occurred accidentally while Prince in1885 was performing another procedure.

**Histopathology Of Pterygium**

It was outlined by Fuchs in 1890

1) Increased number of thickened elastic fibres.

2) Hyaline degeneration of the conjunctival tissue.

3) Concretions

4) Epithelial changes. [17]

**Austin and et al [18]** have summarized as :

2) Hyalinization of the sub-epithelial connective tissue of the substantia propria.

3) Diffuse or lobular collections of eosinophilic granular material with an associated increase in the number of fibroblasts and other cells.

4) Increased number of thickened and tortuous fibres that stain strongly with elastic stains (Elastotic material).

5) Concretions within the hyalinized and granular areas that may show either eosinophilia or basophilia.

6) Squamous cell metaplasia

7) Acanthosis, dyskeratosis.

8) Increased goblet cell density.

Hogan and Alvarado[17] stated that the elastotic material is formed from four sources.

1) Degenerating collagen

2) Pre-existing elastic fibres

3) Abnormal fibroblastic activity

4) Abnormal ground substance

Ultrastructural analysis by Austin et al attributed the Elastotic Degeneration solely to abnormal fibroblastic activity with the production of abnormal maturational forms of elastic fibres.

**Histopathology Of Leading Edge Of Pterygium (Cameron)[19]**

1. Fibroblastic tissue separating the basal corneal epithelial layer from Bowman's layer.
2. Altered orientation of basal corneal epithelial cells overlying the fibroblastic tissue.
3. Destruction of Bowman's layer and superficial corneal stroma.
4. Normal corneal tissue proximal to leading edge of pterygium.

**Immunohistochemical staining:**

Has demonstrated the presence of Altered Limbal Basal Stem Cells between the dissolved edge of Bowman's layer and fibrovascular tissue of the pterygia. [20]

**History Of Pterygium**

According to Bidyadhar[21,22] , Rosenthal, Thomas and Jaros and Deluise, the first recorded description of pterygium and the surgical procedure to treat it was by Susruta

around 1000BC.

Since then Celsus (29 AD), Vagblat (3rd to 4th century), Paul (600AD), Rhazes (932AD), Avicenna (1037AD), Chakradatta (1060AD) and others have described it in detail.

Numerous practitioners, including Merigot de Teigny, Coirre, Aetius, Hippocrates, Celsus and others attempted medical treatment of pterygium. They tried various forms of collyrium of lead, zinc, copper, iron, bile, human milk, white wine, vinegar, silver nitrate, lead acetate, cattle fish bone etc.Rosenthal has concluded his article on the chronology of pterygium therapy by saying.

"Down through history were many who practiced and reported upon various operative techniques without making any outstanding contributions. They number in hundreds and their names may be found in the literature of all nations and all ages. And so it appears that for about 30 centuries man has tried to conquer this little growth called pterygium. It had been incised, removed, split, transplanted, excised, cauterized, grafted, inverted, galvanized, heated, dissected, rotated, coagulated, repositioned and irradiated. It has been analyzed statistically, geographically, etiologically, microscopically and chemically. Yet it grows onward primarily and secondarily, we look with interest to its future"[23].

**Epidemiology**

**Geographic distribution:**

Prevalence of pterygium has been directly related to the proximity to equator: nearer to equator greater the prevalence.

Most commonly seen on either side of the equator, pterygium has been endemic in the Indian subcontinent, Southeast Asia, Hawaii, Samoan Island, the Middle East, Mexico, the Caribbean, Australia, North and West Africa and the Sunbelt states of United States. Cameron's world map summarizes the prevalence rates of pterygium.[1] Generally rare in cooler climates of Europe and the Northern states in the United States, its prevalence, oddly, is high in Inuit (Eskimos).

**Prevalence:**

Prevalence rates have been as high as 22.5% on the island of Aruba ($15^0$ latitude from the equator), 18% in Puerto Rico ($18^0$ latitude) and 5-15% in Texas Florida, california, Arizona and New Mexico in the United States (Latitude 28-$36^0$ from the equator).

Prevalence rates drops to 2% or less in geographic areas > $40^0$ from the equator. A true pterygium is a condition found chiefly in the sunny, hot dusty regions in the world and in the people more exposed to these climatic conditions such as fishermen, farmers, construction workers, roofers, beachgoer's etc. The Inuit are probably exposed to ultra violet rays reflected from snow.

**Age:**

Most commonly seen in the elderly, but the appearance of new cases per annum is higher in younger age group. Pterygium is uncommon in individuals younger than 20 years of age and in people wearing glasses.The incidence of pterygium is greatest in the 20

to 40 years of age group[24,25] Rare case of pterygium is reported in a family at 4,6 and 20 years of age.

**Sex:**

In general, pterygium is twice common in males as in female patients, except in Aruba, where it is equally common in both sexes.

**Etiology of pterygium**

**1. Environmental factors**

Heat, dry atmosphere, winds, exposure to sunlight and abundance of dust were incriminated by many authors to be the etiological factor for pterygium. Dessication from climatic conditions,decrease of lacrimal secretion, tear film abnormality, immune mechanisms have been suggested as adjunctive factors.

**2. Heredity**

Heredity has undoubted influence in the occurrence of pterygia. The inherence is autosomal dominant with low penetrance. But it is not that actual lesion that is transmitted, rather the tendancy of the eye to react in this way to environmental stimuli.

**3. Radiational Factors**

An association with exposure to Ultra Violet Type-B (UVB) light solar radiation has been found to be the most significant risk factor contributing to pterygium development. [1,26,27,28.]

Factors like dry, dusty, climate contribute to development of pterygium. In a risk analysis study recently conducted in Australia, Mackenzie et al showed a several hundred fold higher risk for development of pterygium in subject who worked mainly on sand and

almost a 20 fold increased risk in subjects who worked in an environment that was mainly concrete, compared with those who worked indoors.

**4. Infection And Inflammation**

Scarpa, Friede and Kamer believed that chronic inflammation in the form of conjunctivitis or episcleritis initiate the process, yet inflammatory cells are rarely prominent in pterygium and clinical observation fail to reveal this element in the evolution of lesion.

**5. Immunological Theory**

Hypersensitivity may contribute to the pathogenesis of pterygium. The presence of lymphocytes and plasma cells in the stroma of pterygium indicates that an immunological process may be involved.The presence of IgG and IgE suggests possibility of Type 1 hypersensitivity reaction.

**6. Dietary Deficiencies**

Trophic changes leading to hyperplasia have been considered to be associated with malnutrition like deficiency of choline or a raised blood cholesterol.

**7. Neoplastic Theory**

Neoplastic cause initially suggested by Winter has received considerable support, though the histopathological studies do not support this view. Pterygium extends only in one direction and that too towards an avascular cornea which is against the neoplastic theory.

**8. Allergic Theory**

It is suggested that prolonged exposure to solar radiation can cause denaturation

of proteins, which may act as foreign bodies or antigens. These antigens give rise to formation of antibodies. Interaction between antigen and antibody produces an allergic reaction.

**Involvement of the Second Eye:**

Pterygium is mostly a bilateral condition like many other conditions. One eye may follow the other by months to years. The second eye almost always has a pinguecula that evolves into a pterygium. Most commonly the nasal pterygia are seen in both eyes.

**Pinguecula As A Precursor Of Pterygium**

- Zehender in 1869, introduced the idea that pinguecula was the precursor of pterygium.[29]
- Reaffirmed by Fuchs, Parsons and Alt.
- Once pterygium has grown to a certain extent, it is impossible to locate the position of the supposed precursor or pinguecula, although it is supposed to be in the head of pterygium.
- Pinguecula has no relationship with growth of recurrent pterygium.

**Incidence**

1) Nasal - most common - 60%

2) Temporal - 20%

3) Double - 20%

4) Bilateral

**Classification Of Pterygium**

1) Progressive/pterygium crassum or pterygium vasculosum pterygium carnosum

2) Stationary pterygium

3) Regressive pterygium

**Gerundo's Classification**

a) Proliferative, papillomatous

b) Fibromatous

c) Atrophic, sclerotic

**Townsend [5] - depending on risk of recurrence**

a) Actively growing

b) Fleshy

c) Slowly growing

d) Stationary

e) Atrophic pterygia

**Clinical Features Of Pterygium**

**Signs:**

Pterygium appears as a triangular, fleshy, vascular growth with blunt apex (mimicking the wing of an insect) encroaching the cornea.

**Parts of Pterygium:**

1) Head: The part invading the cornea from the limbus

2) Apex: The most interior portion of the head on cornea with blunt appearance.

3) Body: The widest portion found on the bulbar conjunctival side.

4) Neck: Narrowest portion where the body and head joins

The body of the pterygium has got attachment to episclera lesser than its surface area and hence a probe can be made to pass behind the body for about a mm or so, but not completely underneath it.

**Nasal pterygium is more common than temporal** [30]

1. The normal flow of tears from temporal to nasal side towards the punctum which carries with it any dust particles entering conjunctival sac and accumulates in sulcus lacrimalis. The dust particles may irritate nasal conjunctiva.
2. Greater bowing of the lateral 2/3rd of upper lid and consequent protection by longer lashes.
3. Greater curvature of nasal fibres of orbicularis oculi causing a greater squeezing effect upon nasal subconjunctival tissue.
4. Excess of nasal subconjunctival tissue.
5. Presence of two anterior ciliary arteries on nasal side and only one on temporal side produces greater hyperemic response to dust.
6. The predominance of pterygia on the nasal side is possibly a result of the sun's rays passing laterally through the cornea where it undergoes refraction and becomes focused on the limbic area. Sunlight passes unobstructed from the lateral

side of the eye, focusing on the medial limbus after passing through the cornea.Epidemiological studies have implicated environmental factors such as ultraviolet light, chronic irritation and inflammation as causative factors.

By virtue of various forms of treatment, the hypothesis of loss of the limbal barrier, epithelial initiation of the disease, sub epithelial fibrous tissue proliferation and local immune deficiency are the potential source of the pterygia.

**Illiot's De Fuch's:**

Beyond the apex of the cap, there are greyish white dots.

**SLE:**

Appear as pearly white opacities in the Bowman's membrane

**Stocker's Line:**

In some pterygia, a mm anterior to the cap is seen as a pigment line. This is usually thin, following the contours of the anterior edge of the cap at a discrete interval. Stocker's line indicates chronicity, usually not seen in active and fast growing pterygia. Occurs due to pooling of tears and subsequent iron deposition.

**Current Surgical Procedures for Pterygium Treatment:**

**Bare Sclera Excision:**

The bare sclera method involves surgical dissection of the pterygium, either starting from the head of the pterygium with lamellar keratectomy and extending to remove the body of pterygium or starting from the body and removing the head by

keratectomy or simply peeling it off the cornea.

Castroveijo recommended the use of a very superficial keratectomy, no deeper than necessary, to prevent corneal thinning.

**Technique:**

Most surgeons begin at the apex of the pterygium in clear cornea and with sharp dissection performing superficial lamellar keratectomy upto the neck of pterygium at the limbus.

The body of the pterygium is lifted away from the underlying episclera. There are loose adhesions to the underlying episclera that are cut. Two radial incisions are placed on either side of the body of the pterygium for 5-7 mm depending upon its size. These incisions are united by another incision running parallel to limbus. The head, neck and body of the pterygium are removed in one piece leaving behind the bare sclera.

The conjunctival edges retracted a little, leaving behind a bare sclera area slightly larger than the body of removed pterygium. Hemostasis is achieved with unipolar or bipolar thermal cautery. Care must be taken not to overtreat the episcleral and sclera with thermal cautery, especially if that tissue is to be subsequently exposed to irradiation, thiotepa or mitomycin-C.

Sugar believed that the subconjunctival tissue and tenons capsule served as a medium enabling the regrowth of conjunctiva over the cornea in pterygium recurrence. By excising the subconjunctival episcleral tissue at the limbus, the conjunctiva is allowed to become adherent to underlying sclera, preventing its migration over the cornea.

But histopathological investigation of recurrent pterygium demonstrates that this is not true. Despite strong adhesions to underlying sclera, the recurrent pterygium keeps growing onto the cornea.

The bare sclera method has a very high recurrence rate of 23% to 75%. The conjunctival healing process after bare-sclera excision is usually very invasive, more so than the original pterygium, and frequently seen as post operative conjunctival granuloma formation that grows onto the cornea to form a recurrent pterygium. Recurrent pterygium grows much more quickly and into a bigger pterygium than the primary pterygium.

**Mitomycin-C**

Mitomycin-C is an antibiotic that was first isolated from Streptomyces caespitosus by Hata in 1956.[31]

The topical use of mitomycin-C to prevent pterygium recurrence was first described by Kunitomo and Mori in the early 1960s in Japan. Since that time, numerous investigators have reported that topical mitomycin-C is efficacious in decreasing recurrence rates after pterygium excision.

Following reductive activation, mitomycin-C interacts with DNA to form monofunctional adducts as well as covalent cross links between the two complementary strands of DNA. Monofunctional adduct formation occurs 10-20 times more frequently than cross linking. The preferred molecular target in DNA for covalent attachment by mitomycin-C is the N2 position of guanine.

These modifications of DNA are responsible for the antibiotic and antineoplastic activity of mitomycin-C because molecular synthesis cannot progress normally with such permanent alterations. Additionally, the production of toxic oxygen free radicals from mitomycin-C in vivo has been postulated that could cause significant damage to any membrane with unsaturated lipids. Overall, mitomycin-C has the greatest anti-proliferative effect on those cells showing the highest rate of mitosis.

The use of topical mitomycin-C after pterygium surgery was popularized in the United States by Singh et al[32]. In a double masked prospective fashion after pterygium excision, patients were treated with either 1mg/ml mitomycin-C eye drops, 0.4mg/ml mitomycin-C eye drops or placebo 4 times/day for 2 weeks.

With an average of 5 months follow up, recurrences were found to be 89% in the placebo group versus 2.3% in the mitomycin-C groups combined. Patients receiving the 1mg/ml mitomycin-C dosage experienced worse conjunctival irritation, superficial keratitis and excessive lacrimation when compared to patients receiving the 0.4mg/ml dosage. No systemic toxicity was reported for either dosage. A subsequent publication by the same authors confirmed only one recurrence in 58 mitomycin-C treated patients followed for 1-2 years.

Subsequent investigations by other authors have confirmed the low recurrence after treatment with 0.4mg/ml topical mitomycin-C. Other authors report good success with short courses of 0.2mg/ml mitomycin-C drops with recurrence rates between 5-9%. Overall these studies indicate that adjunctive topical mitomycin-C is effective in reducing recurrences after pterygium excision. However the use of post operative mitomycin-C eye drops is not free of complications.

Yamanouchi et al[33] reported on 15 patients with severe scleral complications following topical mitomycin-C application after pterygium excision. Hayasaka et al[34] reported four cases of scleral ulceration 18-25 years after the use of 0.4mg/ml mitomycin-C drops 4 times/day for 2-3 weeks after simple pterygium excision.

Ocular irritation, photophobia, delay in epithelial healing and avascularity of the sclera and cornea seen in significant number of cases treated with mitomycin-c. This toxic effect is likely to be immune mediated [35].

Cano-Parra et al[36] showed similar results in a study of primary pterygia with intra-operative 0.1mg/l mitomycin-C for 5 minutes after a mean of 14.1 months. All these studies reported no serious complications. Recurrence rates are similar in studies that compare intra-operative mitomycin-C to post operative drops. Corneo-scleral melt has been reported in a patient who underwent intra- operative 0.2mg/ml mitomycin-C for 3 minutes with a sliding conjunctival flap[37].

Unfortunately, the optimal dosage and treatment length of topical mitomycin- C to maximize both effectiveness and safety are not precisely known, clues to the optimum dosage may be inferred from a study on the inhibitory effects of mitomycin- C on human tenons capsule fibroblasts in cell culture; cell colony formation was inhibited at mitomycin-C concentrations of 0.1mg/ml. Cell death ensued at concentrations of 0.3mg/ml and the LD 50 for these fibroblasts was 0.2mg/ml [31] Regarding stability of topical solution reconstituted mitomycin-C has a pH of 6-8 and is stable for 2 weeks when refrigerated at 2-8$^0$C[38].

**Technique Of Conjunctival Autografting**

Conjunctival autograft transplantation was described as a treatment for pterygium by Kenyon et al in 1985.

**Technique**

A free conjunctival graft from the superotemporal bulbar conjunctiva is used to resurface the exposed scleral surface after pterygium resection. The inclusion of limbal tissue in the autograft may be beneficial as a barrier. After the excision of the pterygium, the size of the scleral defect is measured with castroveijo calipers.The globe is then rotated downwards using the stay sutures to expose the superior bulbar conjunctiva.The dimensions of the intended conjunctival graft (adjacent to limbus) are marked with a gentian violet marking pen based on the previous measurements of the recipients bed.

Balanced salt solution is injected subconjunctivally outside the gentian violet marks to elevate the conjunctiva to aid in the conjunctival dissection.Blunt wescott scissors are used to incise the conjunctiva outside the gentian violet marks along the posterior border of the graft.The conjunctiva is then undermined using blunt dissector with care not to include the tenon's capsule in the final graft.

The lateral edges of the donor graft are incised outside of the gentian violet marks as the dissection is carried forward. It is important to note that the graft is purposely excised outside of the gentian violet marks so that these marks can be used for later orientation.

The donor graft should be as thin as possible so that postoperative healing will occur with less shrinkage. The tissues are not allowed to dry during the procedure and are moistened with frequent applications of balanced salt solution. Handling of the graft

should be with nontoothed forceps so as to avoid a button hole in the graft. At this point the graft is repositioned into the recipient bed.

The graft is oriented with the unmarked limbal donor edge adjacent to the limbus in the recipient bed and the graft marks on the exposed surface of the conjunctiva. The graft is sutured to the recipients conjunctival edge and underlying episclera with numerous 10-0 nylon sutures (buried knots) or with 8-0 vicryl sutures.

The majority of the sutures usually extrude or dissolve within 1 month postoperatively while the rest usually epithelialise and remain buried. The donor harvest site is left to epithelialise on its own which usually occurs within first several days postoperatively. Antibiotic steroid drops are advised 4-6 times a day and are titrated according to the degree of inflammation and then over 4-6 weeks.

Primary disadvantage is the prolonged operative time required when compared to other techniques.Complications from conjunctival autografting are infrequent and generally not sight threatening, Minor problems such as graft edema corneoscleral dellen , epithelial cysts,tenon's granuloma, hematoma ,necrosis and extraocular muscle disinsertion are uncommon.

## SURGICAL TECHNIQUE

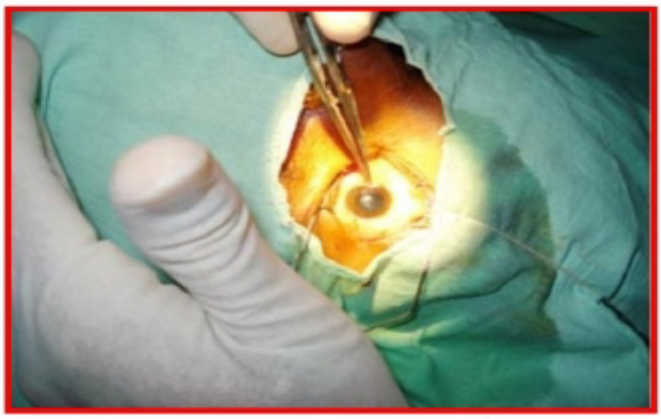


Fig:1 Peeling pterygium head from cornea

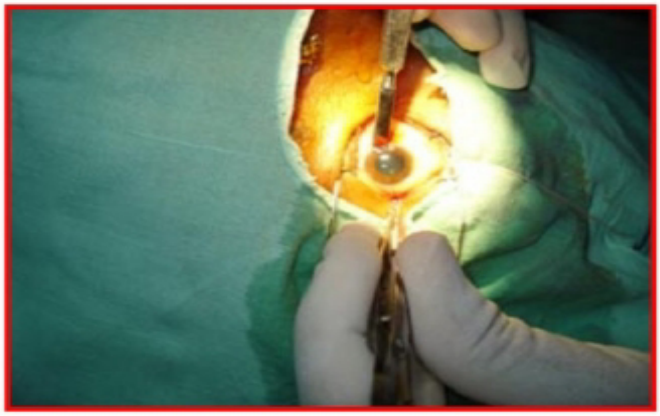


Fig:2 Dissecting head of pterygium from cornea

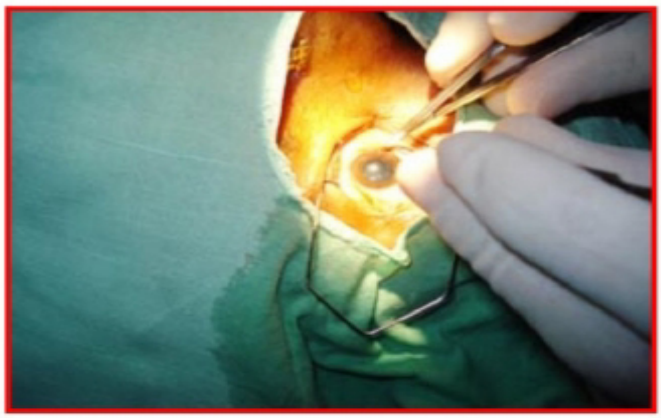


Fig:3 Removal of body of pterygium

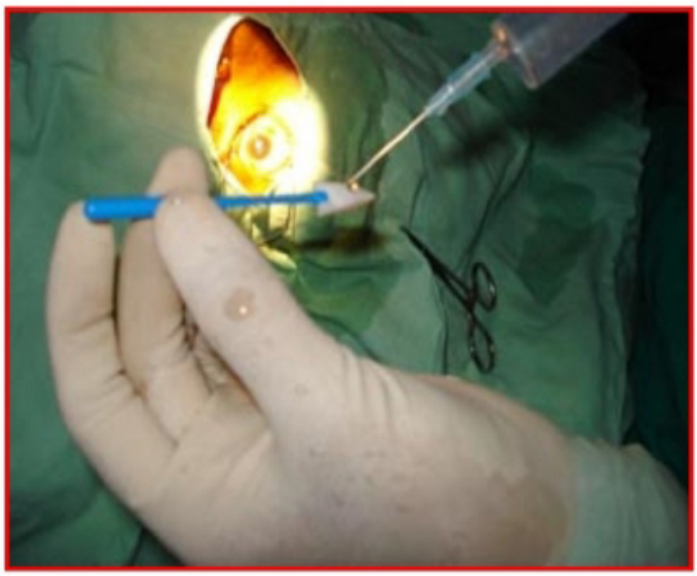


Fig:4 Preparation of mitomycin C

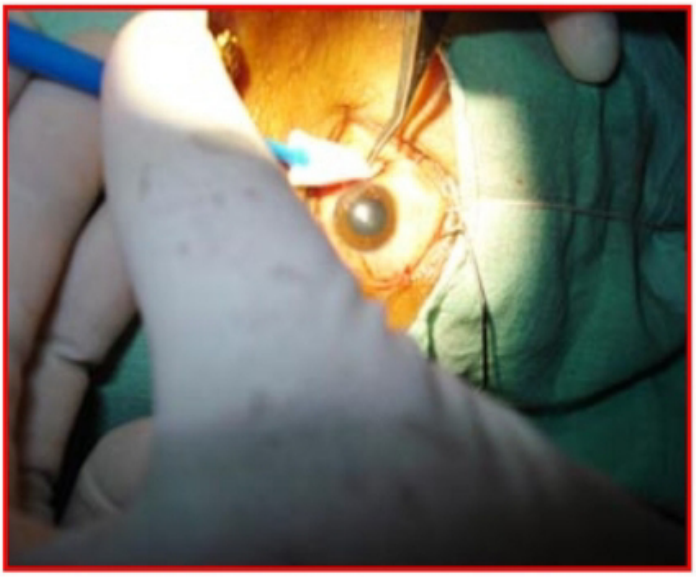


Fig:5 Intraoperative application of 0.02% mitomycin C

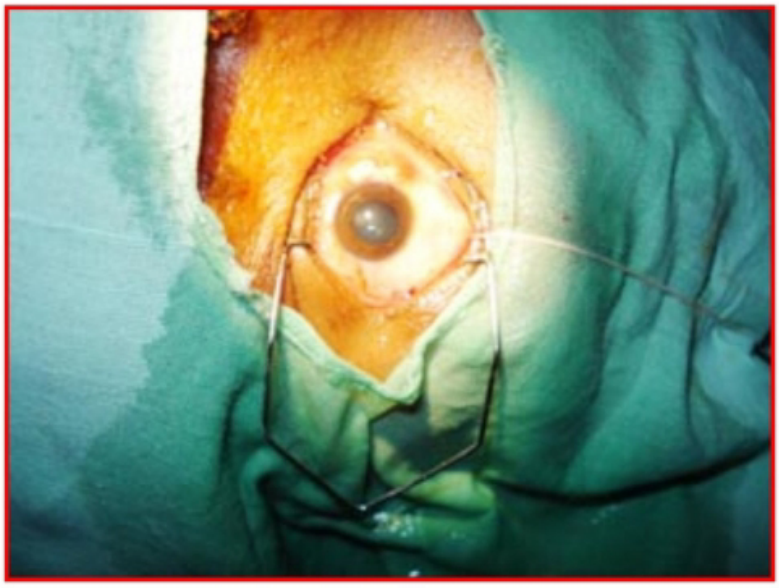
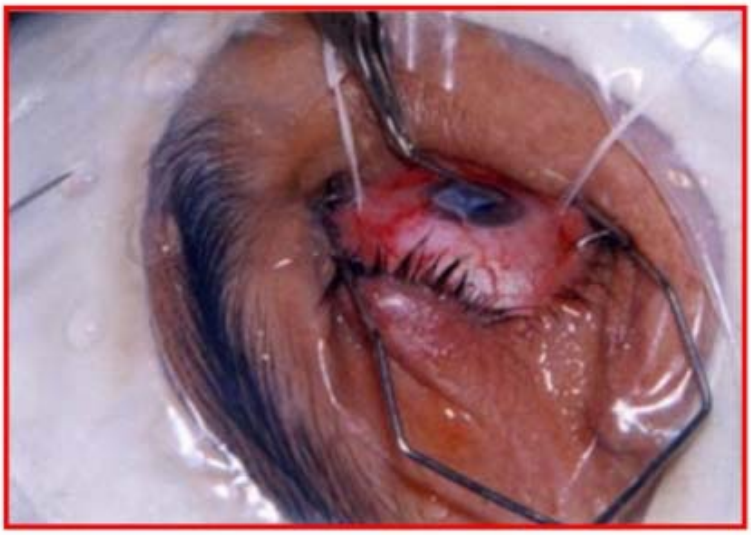


Fig:6 Appearance following mitomycin C application



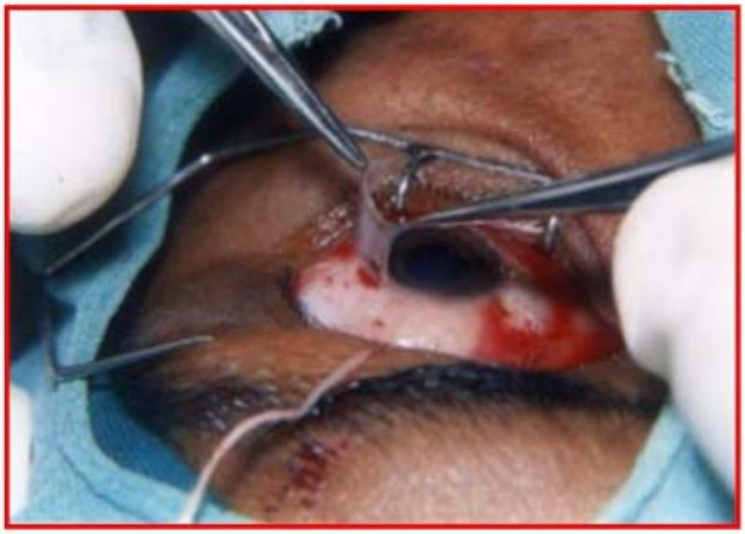
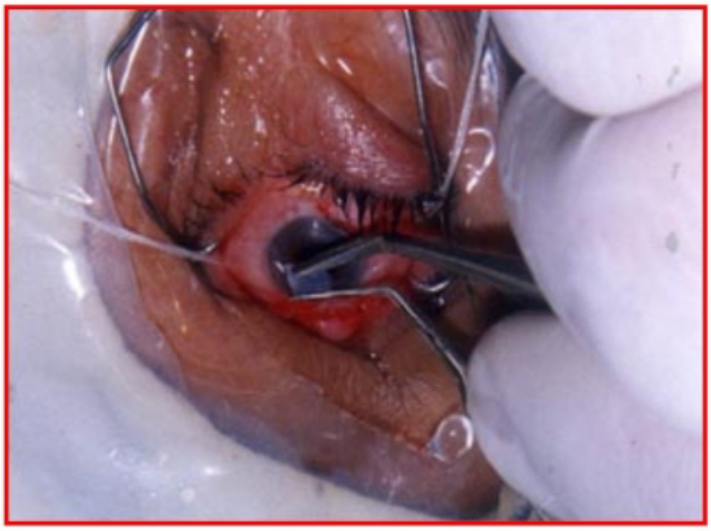


Fig: 7,8 Dissection of conjunctival limbal autograft



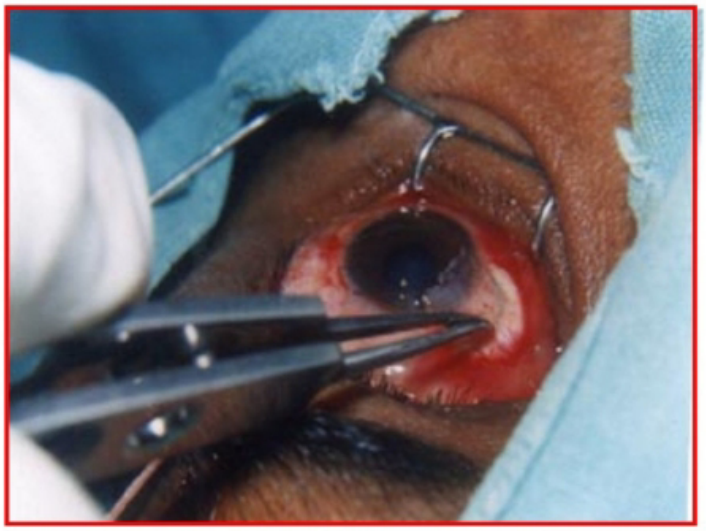


**Fig:9,10 Graft dissected from forniceal end towards limbus Dissection continued into the limbus to involve limbal stem cells Graft excised with vanna's scissors Graft slid towards host bed maintaining limbus to limbus orientation**

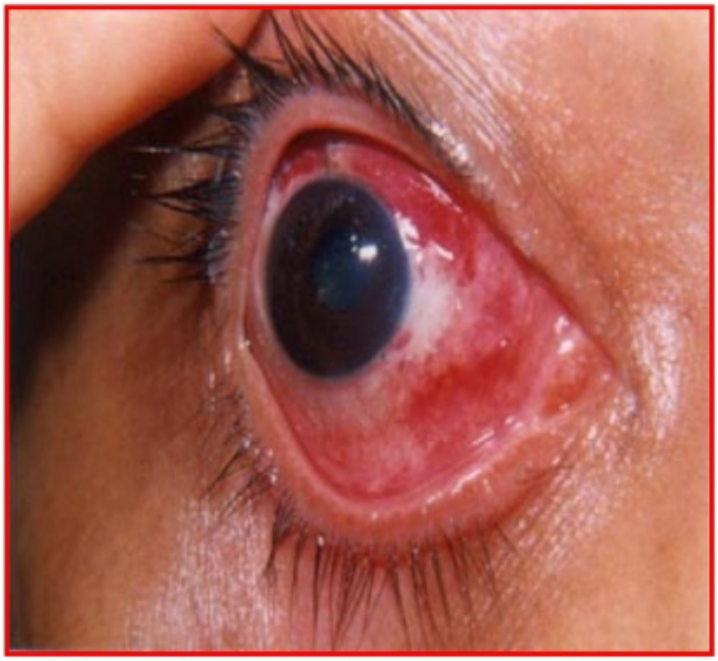


**Fig:11 Graft Suturing.**
**Four corners of the graft sutured with 10-0 monofilament Nylon.**

# METHODOLOGY

**Materials and methods:-**

**Source of data:-**

It is a hospital based study of 45 patients who were operated for pterygium ,in which 22 patients underwent pterygium excision with bare sclera technique with intraoperative Mitomycin- C and 23 patients were treated pterygium excision with conjunctival autograft .

All patients were inpatients of BLDE university's, Shri B.M. Patil Medical College, Hospital and Research Centre during the study period between Oct 2008 to Mar 2010.

**Method Of Collection Of Data:-**

**Sample Size:-** with 3% prevalence rate of pterygium, 95% confidence level and 5% margin of error my sample size for this study is 45, using the following statistical formula:-

$$n = \frac{4pq}{d^2}$$

**Statistical analysis:-**

1. Diagramatic presentation
2. Mean +/- standard deviation
3. Suitable statistical lists like MC numers, $x^2$ test,or chi square test.

**Notification of cases:-**

Patients admitted for Pterygium surgery during the study period were included for the study. A total number of 45 cases patients were studied. The data collected were categorised into age, sex and occupation. Detailed history was taken regarding the

duration of symptoms and treatment history. Ocular examination including visual acuity, sac syringing, intra ocular pressure, slit lamp examination and fundoscopy was done.

Investigations like blood and urine examination, random blood sugar, HIV, HBS Ag were carried out .Medical fitness for surgery was taken whenever required. All patients were admitted 1-2 days before surgery and local antibiotic drops were started preoperatively. Steroid - antibiotic eye drop instilled post operatively for 4 to 6 weeks.

Patients selected for the particular procedure by giving serial numbers, patients with even number were subjected for pterygium excision with intraoperative mitomycin-C and patients with odd numbers were subjected for pterygium excision with conjunctival autograft. Following day of surgery detailed slit lamp examination of the graft and post operative visual acuity was assessed. Other parameters like pain, oedema and congestion were studied in both the procedures. Follow up was done on day 1, after first week, $4^{th}$ week, $3^{rd}$ month and $6^{th}$ month to study the recurrence, effectiveness and complications of the two procedures.

The following parameters were studied:-

- Complications
- Effectiveness
- Recurrence rate

**Inclusion Criteria**

All adults, otherwise healthy patients, who came to the hospital with primary pterygia were included in the study.

**Exclusion Criteria**

1. Very old patients

2. Pregnant women

3. Poor patient compliance those who are not willing to come for follow up upto 6

months

4.Those with predisposing conditions to ulceration or poor wound healing such as immunocompromised patients, sjogrens syndrome, diabetes mellitus, herpetic keratitis,etc

5. Recurrent pterygia

6. Those with previous ocular surgery

7. Young adults <20 years of age

**Preoperative Preparation:-** All medications for patients who were on treatment were continued. All patients were put on topical ciprofloxacin eye drops 4 times per day.

**Preliminiary Examination:-**

- Preliminary examination under torch light and visual acuity testing by Snellen's chart was done for all patients participating in the study.
- Slit lamp examination to study the morphology and grades of pterygium in detail.
- Tonometry.
- Lacrimal sac syringing.
- Direct and indirect ophthalmoscopy.

**Following investigations were carried out in all patients:-**

1. Investigations to screen diabetic patients – Urine sugar and RBS
2. Hypertensive patients – Recording of blood pressure.
3. Screening for HIV 1 and 2
4. Complete haemogram ,bleeding time, andclotting time.

**Surgical Techniques**

In this study, cases were selected alternatively and numbered. Patients with even number underwent pterygium excision received 0.02% of intraoperative mitomycin C for 2 minutes and patients with odd numbers underwent pterygium excision with conjunctival limbal autografting .

**Postoperative Treatment**

All patients received antibiotic steroid eye drops 6 times daily and tapered over 6 weeks along with lubricating eye ointment applied 4 times daily.

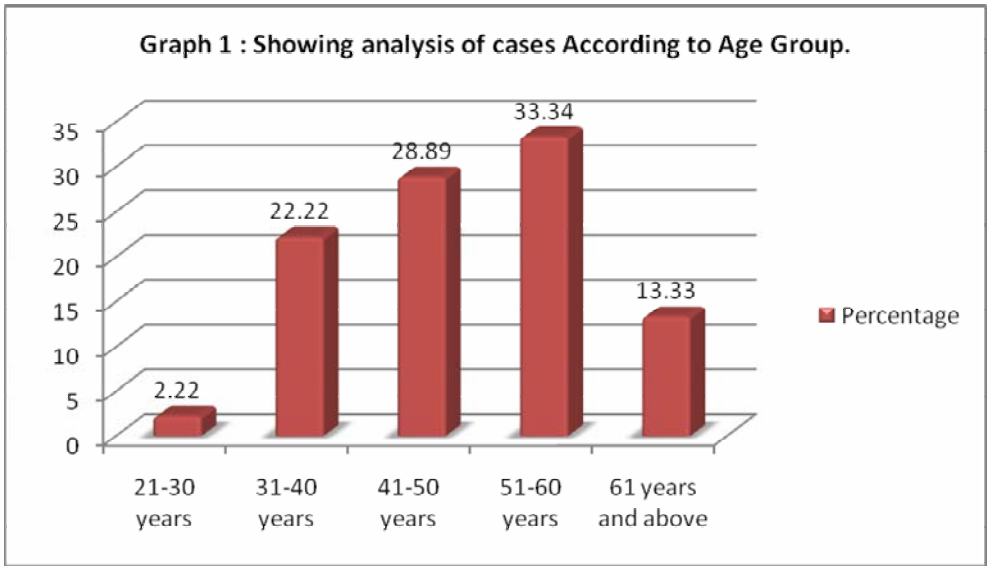
**Follow Up**

All patients were discharged on the third postoperative day and were examined after 7 days,1 month, 3 months and 6 months. During the follow up patients were examined for the recurrence of pterygium, possible side effects of mitomyin C and graft complications.

# RESULTS

**Table 1 : Analysis of cases According to age Group**

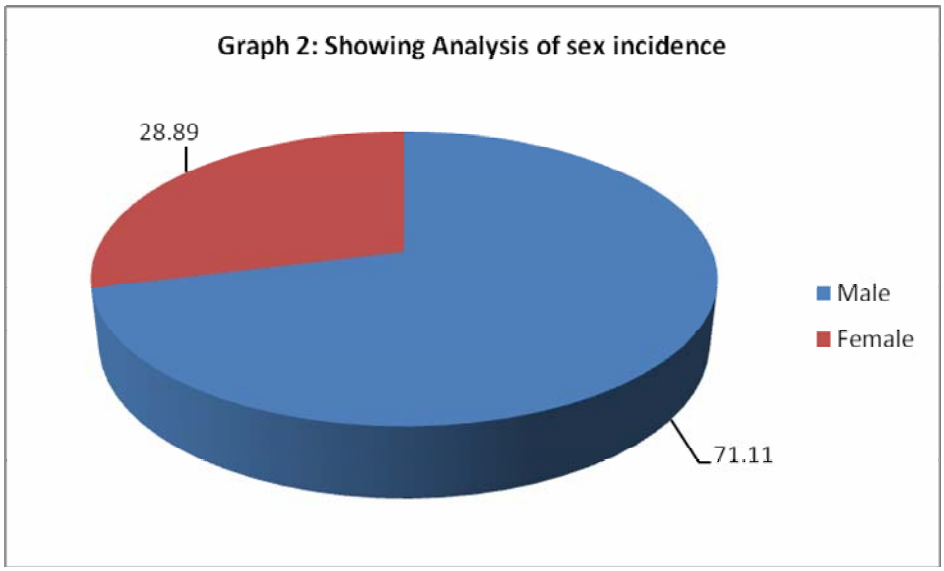
| Age Group | Number of cases | Percentage |
|---|---|---|
| 21-30 years | 01 | 2.22 |
| 31-40 years | 10 | 22.22 |
| 41-50 years | 13 | 28.89 |
| 51-60 years | 15 | 33.34 |
| 61 years and above | 06 | 13.33 |




The majority of patients were in the age group 51 to 60 years (33.34%). The mean age group was 48.9 years.

**Table 2 : Analysis of sex incidence**

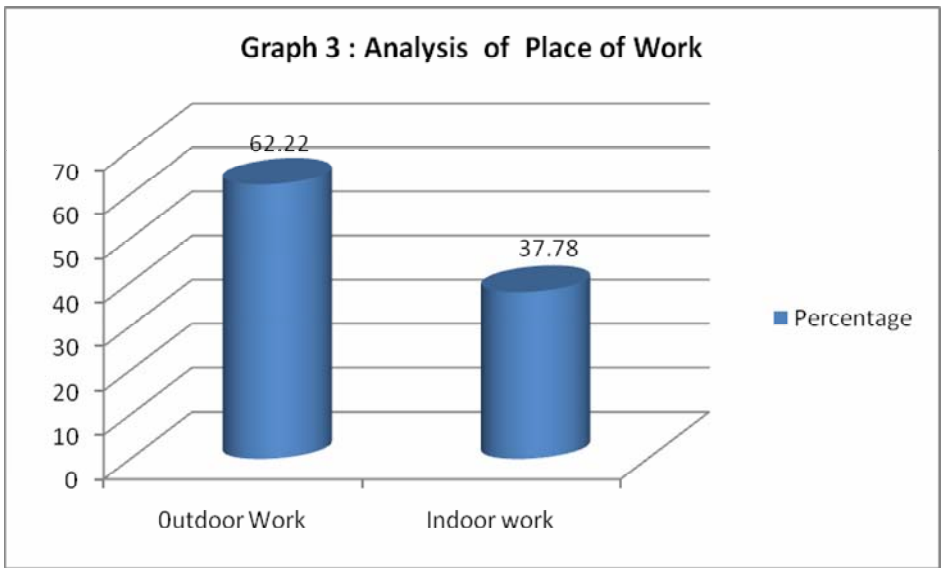
| Sex | Number of cases | Percentage |
|---|---|---|
| Male | 32 | 71.11 |
| Female | 13 | 28.89 |




Incidence of pterygium is higher in men due to more outdoor work . In this study 71.11% were males and 28.89% female.

**Table :3 Analysis of Place of Work**

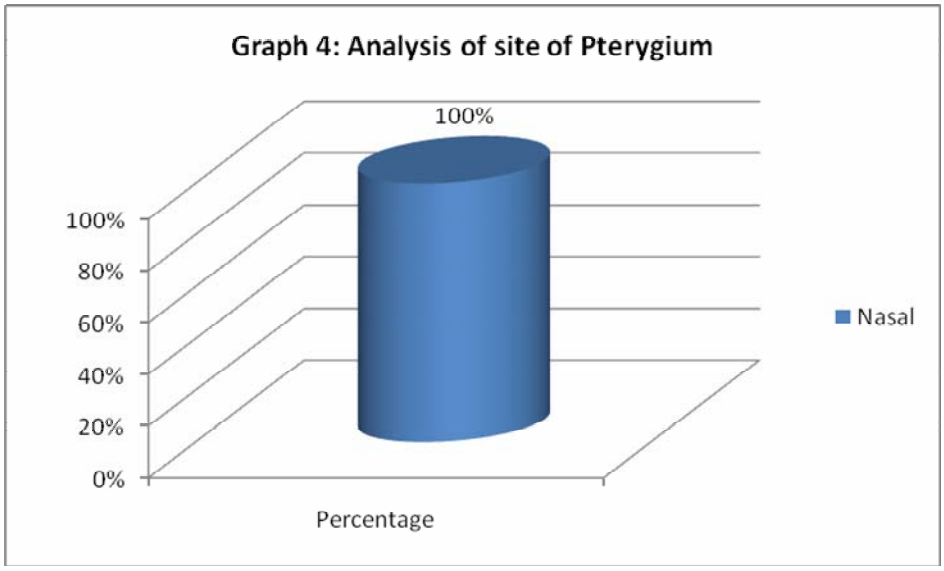
| Nature of Work | Number of Cases | Percentage |
|---|---|---|
| 0utdoor Work | 28 | 62.22 |
| Indoor work | 17 | 37.78 |




In this study 28 cases (62.22%) were outdoor works and 17 cases (37.78%) were indoor works Incidence of pterygium is higher in outdoor works due to more exposure to dust, winds solar radiation. Increased exposure to heat, dust, winds causes rapid evaporation of tear film leading to drying of epithelium and increased vulnerability to damage by ultraviolet radiation.

**Table 4 : Analysis of site of Pterygium**

| Site | Number of cases | Percentage |
|---|---|---|
| Nasal | 45 | 100% |



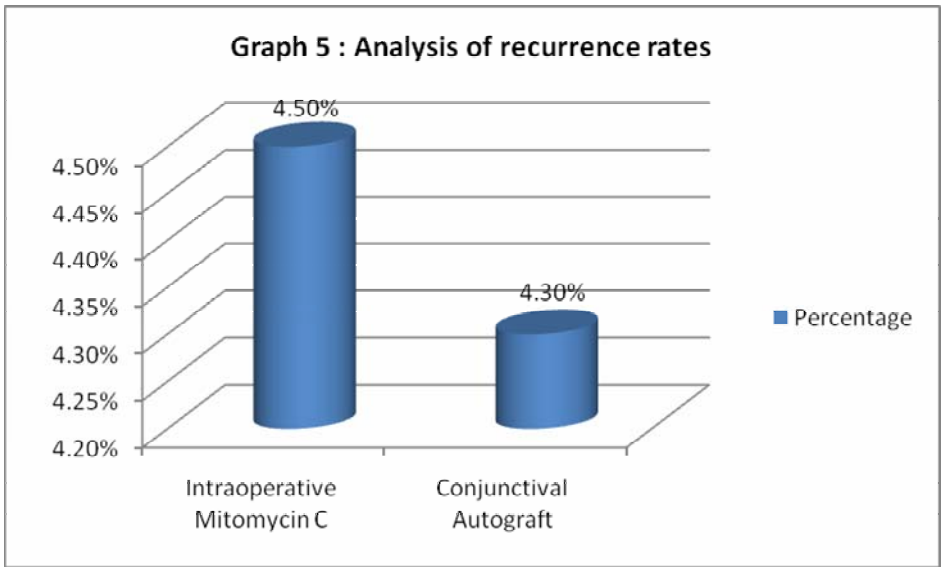

The occurrence of pterying is more on the nasal side . Among 45 patients , all 45 cases 100% had nasal pterygium.

**Table 5: Analysis of recurrence rates**

| Group | No of Recurrence | Percentage |
|---|---|---|
| Intraoperative Mitomycin C | 01 | 4.5% |
| Conjunctival Autograft | 01 | 4.3% |

**Statistical test:** **Z- TEST**

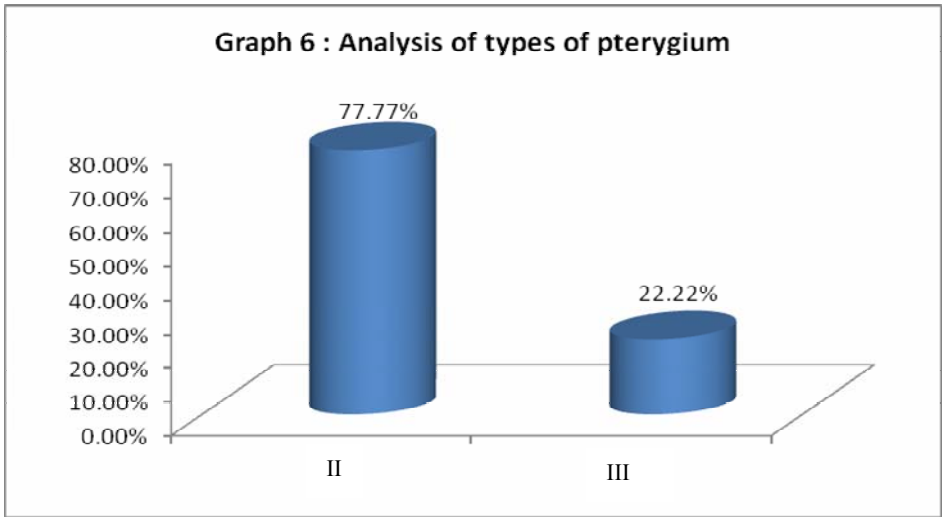
**Between group l and 2** **Z= 0.03** **p = 0.974 not significant**




The recurrence rate of pterygium in the bare sclera group with intraoperative mitomycin C was 4.5% (1 case) and with conjuctional limbal autograft was 4.3% (1 case). Out of 2 recurrences 1 case were seen in the age group of 31-40 years and 1 case above 50 years.

**Table 6: Analysis of types of pterygium. ( according to Donald and Tan grading)**

| Types | Number of patients | Percentage |
|---|---|---|
| II | 35 | 77.77% |
| III | 15 | 22.22% |

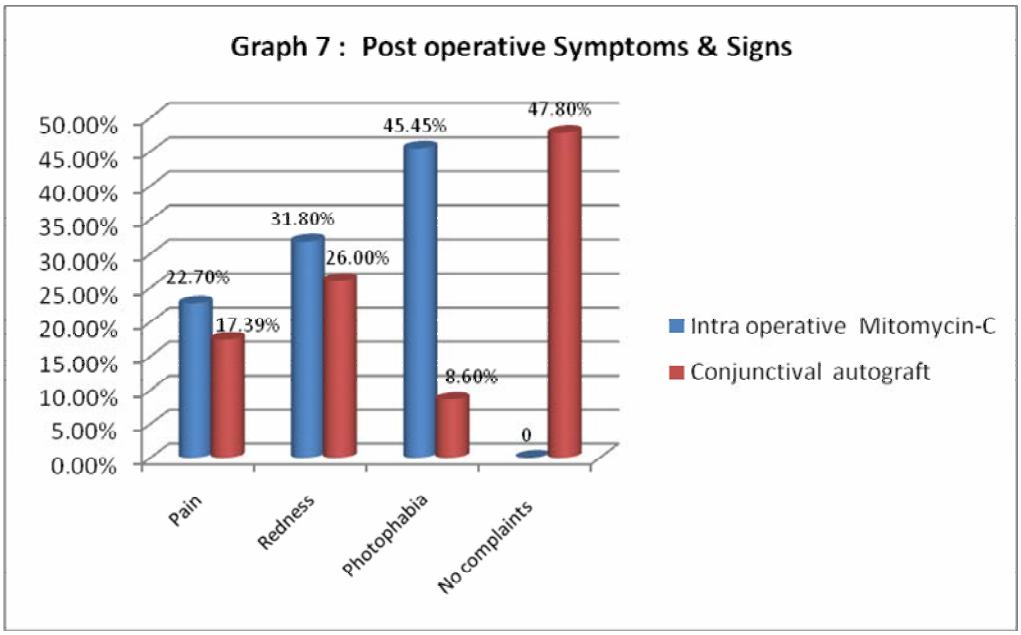



Majority of patients were type II (77.7%.)

**Table 7: Analysis of post operative symptoms and signs ;-**

| | Intra operative Mitomycin -C | | Conjunctival Autograft | |
|---|---|---|---|---|
| Post operative Symptoms & Signs | No of patients | Percentage | No of patients | Percentage |
| Pain | 5 | 22.7% | 4 | 17.39% |
| Redness | 7 | 31.8% | 6 | 26.0% |
| Photophabia | 10 | 45.45% | 2 | 8.6% |
| No complaints | 0 | 0 | 11 | 47.8% |
| Total | 22 | 100 | 23 | 100 |

Statistical analysis: chi- square = 16. 507 p= 0.001 significant




Patients with intra operative mitomycin-c had more photophobia( 45%), pain(22%) and redness (31%) when compared to patients with autograft which was significant statistically.

CASE NO:2

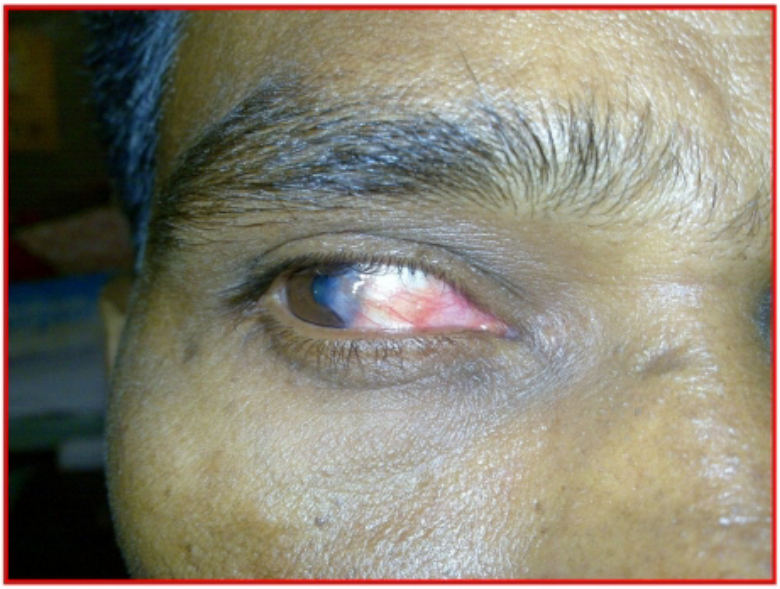


Fig:12 Primary progressive nasal pterygium

CASE NO:5

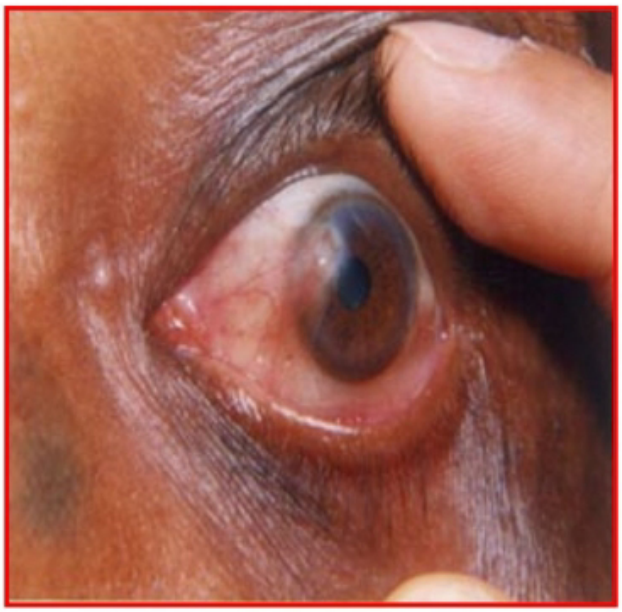


Fig:13 Primary progressive nasal pterygium

CASE NO:21

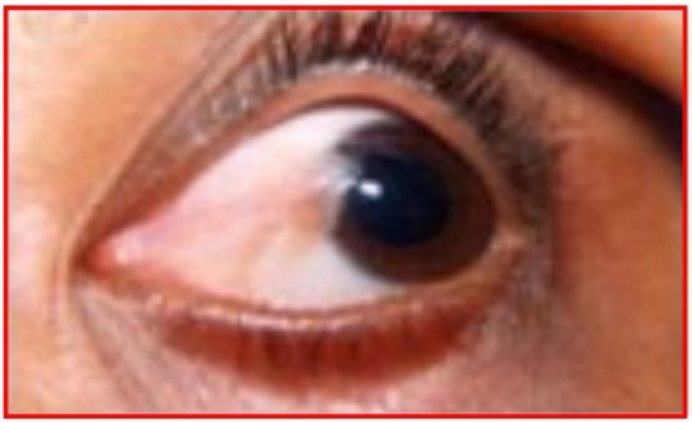


**Fig:14 Primary pterygium**

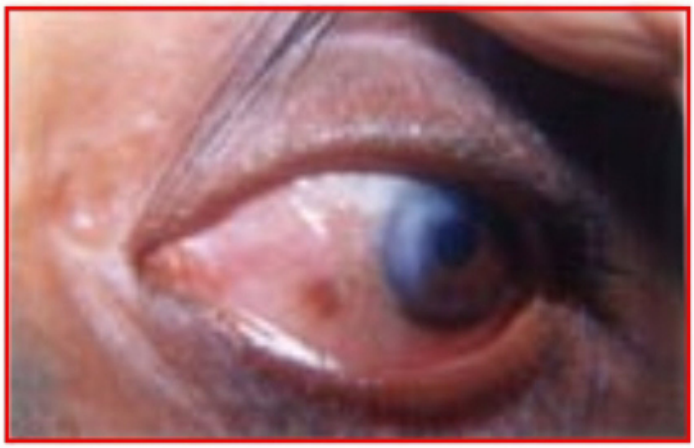


**Fig:15 Immediate Post Operative**

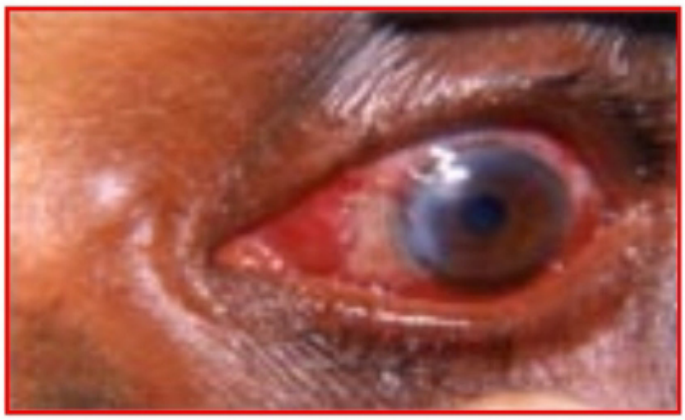


**Fig:16 Late Post Operative - 2 Months**

**CASE NO:19**

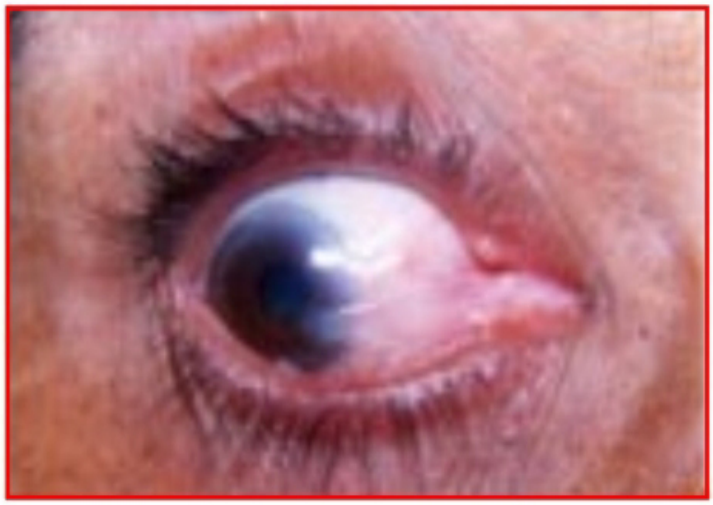


**Fig: 17 Recurrent**

**CASE NO:38**

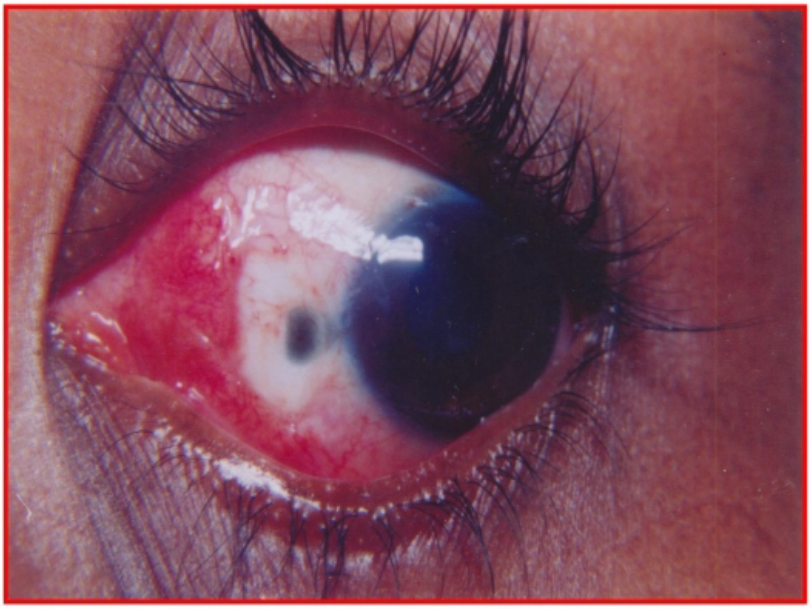


**Fig:18 Scleral thinning following intraoperative mitomycin C application**

# DISCUSSION

The only effective treatment for pterygium is surgery. However none of the surgical procedures are perfect and universally accepted because of high recurrence rates. Pterygium excision by bare sclera technique was first described by Ombrain. However it is associated with a recurrence rate of 23-75%[4,5,6,30]. Because of this increased recurrence rate, adjunctive treatment was necessary to achieve good results.

Mitomycin - C is an antimetabolite with antiproliferative effects on cells. It is produced by Streptomyces caespitosus. Use of topical mitomycin - C in pterygium surgery is a simple procedure and its success in preventing recurrence has made its usage very popular [39]. The complications like conjunctival irritation, superficial punctate keratitis, corneal melt, scleral thinning appear to be dose related and its toxicity increases dramatically with increasing cumulative dose.

Mitomycin -C has been used after pterygium excision either intraoperatively or postoperatively. Surgeons all over the world have used different doses ranging from 0.01% to 0.04% for a duration of 1 to 5 minutes intraoperatively.

Conjunctival autografting is safe and cost effective method in preventing recurrence. Studies have shown that both intraoperative mitomycin- C and conjunctival autograft techniques are equally effective [40,41,42] Purpose of this study is to compare the out come, effectiveness and recurrence rates after pterygium excision with intraoperative mitomycin C and conjunctival limbal autograft. In this study 45 cases of primary pterygium were evaluated. Mean age group was 37.8 years. 71.11% males and 28.89% females presented to us with pterygium.

Literature documents more incidence of pterygium in outdoor workers. This correlated with our study findings were in 62.2% presented who were working outdoors exposing there eyes to heat, dust and sunlight. On studying the site of occurrence of pterygium 100 % of patients had nasal pterygium. This is in accordance with findings in the literature.

In this study 45 cases were selected alternatively and numbered. Patients with even number underwent pterygium excision received 0.02% of intraoperative mitomycin C for 2 minutes and patients with odd numbers underwent pterygium excision with conjunctival limbal autografting.

All cases were followed up for 6 months. In intraoperative mitomycin C and conjunctival autograft technique 1 case( 4.5% ) and (4.3% ) of recurrence in each was seen respectively .1case (4.5% ) had scleral thinning following mitomycin -C application which resolved after tapering the steroid dosage. Hence this study shows that both intraoperative mitomycin C and conjunctival autograft techniques are equally effective which is in accordance with literature.

# SUMMARY

The only effective treatment for pterygium is surgery. However none of the surgical procedures are perfect and universally accepted because of high recurrence rates. Pterygium excision by bare sclera technique was first described by Ombrain. However it is associated with a recurrence rate of 23-75%[4,5,6,30].

Mitomycin C is an antimetabolite with antiproliferative effects on cells. It is produced by Streptomyces caespitosus. Mitomycin C has been used after pterygium excision either intraoperatively or postoperatively.

Conjunctival autografting is safe and cost effective method in preventing recurrence. Studies have shown that both intraoperative mitomycin C and conjunctival limbal autograft techniques are equally effective [40,41,42]

Purpose of this study is to compare out come and the recurrence rates after pterygium excision with , intraoperative mitomycin - C and conjunctival autograft.

In this study 45 cases of primary pterygium were evaluated. Mean age group was 46.7 years. 71.11% males and 28.89% females presented to us with pterygium. Literature documents more incidence of pterygium in outdoor workers. This correlated with our study findings were in 62.2% presented who were working outdoors exposing there eyes to heat, dust and sunlight.

On studying the site of occurrence of pterygium 100 % of patients had nasal pterygium. In this study 45 cases were selected and numberd into 2 groups of 22 and 23 each. Patients with even numbers underwent pterygium excision with 0.02% of intraoperative mitomycin C for 2 minutes and patients with odd numbers underwent pterygium excision with conjunctival limbal autografting.

All cases were followed upto 6 months. There was 1 recurrence each in intraoperative mitomycin C and conjunctival autograft technique.

1 case had scleral thinning following mitomycin -C application which resolved after tapering the steroid dosage. Patients with intraoperative mitomycin-C had more post operative complaints like photophobia, redness and pain when compared to patients with conjunctival autograft.Hence this study shows that both intraoperative mitomycin C and conjunctival autograft techniques are equally effective in preventing the recurrence but the later is safe and cost effective, which is in accordance with literature.

# CONCLUSION

In this study 45 cases were selected alternatively and numbered .Patients with even numbers underwent pterygium excision received 0.02% of intraoperative mitomycin C for 2 minutes and patients with odd numbers underwent pterygium excision with conjunctival limbal autografting.

In the two procedures 1 case had recurrenc in intraoperative mitomycin C and 1 case in conjunctival autograft technique. 1 case had scleral thinning following mitomycin C application. Hence low dose of intraoperative mitomycin C and conjunctival limbal autografting techniques are effective methods in preventing recurrence of pterygium than bare sclera technique.

Although both intraoperative mitomycin C and conjunctival limbal autograft techniques are equally effective the latter is more safe and cost effective because of lesser complications.

Patients with intraoperative mitomycin-C had more post operative complaints like photophobia, redness and pain when compared to patients with conjunctival autograft.

The sample size studied in this study was less and hence this study requires a large group of patients and long term follow up for the incidence of recurrence rate.

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# PROFORMA

Name of the patient :

Age :

Address :

IP. No. :

Date of admission :

Date of surgery :

Date of discharge :

1) Chief complaints :

2) History of presenting illness :

3) Past history : H/o Chemical burns/ Corneal ulcers/ trauma/ drug allergies/ pterygium excision/ treatment history. Any history suggestive of rheumatoid arthritis.

4) Personal History :

5) General physical examination : a) Pulse

b) B.P

c) Respiratory rate

6) Preoperative : Right Eye Left Eye

a) Visual acuity

b) Pin hole

c) Refraction

d) IOP

e) Sac syringing

7) Ocular examination :

a) Head posture

Right Eye Left Eye

b) Extra Ocular movements

(Any restriction)

c) Adnexa

d) Conjunctiva

Pterygium

i) Size

ii) Shape

iii) Circumferential extent on the cornea

iv) Radial extent in relation to cornea

v) Vascularity

vi) Infiltration.

vii) Type of pterygium type II/ type III

e) Cornea

f) Anterior Chamber

g) Iris

h) Pupil

i) Lens

j) Fundoscopy

8) Investigations :

a) Hb%

b) Urine – Sugar

c) Random blood sugar

d) HIV

e) HBsAg

9) Treatment : Pterygium excision with bare sclera,

a) With intra operative 0.02% Mintomycin – C

b) With conjunctival autograft

- Surgeon's Name
- Intraoperative complications

10) Post operative treatment :

11) Post operative follow up :

| | I$^{st}$ day | I$^{st}$ week | IV$^{th}$ week | III$^{rd}$ month | VI$^{th}$ month |
|---|---|---|---|---|---|
| i) Pain | | | | | |
| ii) Foreign body sensation | | | | | |
| iii) Photophobia | | | | | |
| iv) Conjuctival congestion | | | | | |
| v) Edema | | | | | |
| vi) Graft :<br>Vascularity<br>Necrosis<br>Failure | | | | | |
| vii) Sclera | | | | | |
| viii) Scleral necrosis | | | | | |
| ix) Limbal avascularity | | | | | |
| x) Scleritis | | | | | |
| xi) Cornea | | | | | |
| xii) Post operative recurrence<br>Yes / No. | | | | | |

# ANNEXURE – VI

## RESEARCH SAMPLE INFORMED CONSENT.

**Consent will be taken from each of the patients before procedure.**

**TITLE OF PROJECT** : **"Comparative Study of Pterygium excision with bare sclera with intraoperative 0.02% Mitomycin-C versus Pterygium excision with conjunctival auto graft".**

**GUIDE** : **Dr Vallabha .K**

**PG STUDENT** : **Dr Akshatha. L. Chavan**.

**PURPOSE OF RESEARCH:-**

I have been explained about the reason for doing this study and selecting patients as subjects of the study.

This study is for better understanding of the effectiveness and safety of the two procedures in pterygium which will help in future for better selection of the procedure for ptergium surgery.

**PROCEDURE:-**

I understand that I will undergo pterygium surgery by random selection.

**RISK AND DISCOMFORT**:-

I clearly understand the risk involved in the procedure.

**BENEFITS :-**

I understand my participation in this study will help in selection of safe and effective procedure for ptyrgium surgery .

**REFUSAL FOR WITHDRAWAL OF PARTICIPATION**:-

I understand that my participation is voluntary and that I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice. I also understand that Dr. Akshatha L. Chavan may terminate my participation in the study after he has explained the reasons for doing so.

**CONFIDENTIALITY:**

I understand that medical information produced by this study will become part of institutional records and will be subject to the confidentiality and privacy regulation of the said institute. Information of a sensitive personal nature will not be a part of medical record, but will be stored in investigators research file and identified only by a code number. The code key connecting name two numbers will be kept in a separate secured location.

If the data are used for publication in the medical literature and for teaching purposes no names will be used and other identities such as photographs, audio and video tapes will be used only with my special written permission. I understand I may see the photographs and the video tapes and have the audio tapes before giving this permission.

**INJURY STATEMENT:**

I understand that in unlikely event of injury to me resulting directly from my participation in this study, if such injury were reported promptly, then medical treatment will be available to me, but no further compensation would be provided.I understand that by my agreement to participate in this study I am not waiving any of my legal rights.

I have explained to _____ (patient's/relevant guardian) the purpose of the research, the procedure required and the possible risk and benefits to the best of my ability.

_____ _____

Dr. Akshatha. L. Chavan Date

(Investigator)

**STUDY SUBJECT CONSENT STATEMENT:**

I confirm that I Dr. Akshatha. L. Chavan has explained to me the purpose of research, the study procedure, that I will undergo and the possible discomforts as well as benefits that I may experience in my own language. I have been explained all the above in detail in my own language and I understand the same. Therefore I agree to give consent to participate as a subject in this research project.

| | |
|---|---|
| _____ | _____ |
| (Participant) | Date |
| _____ | _____ |
| (Witness to signature) | Date |

## KEY TO MASTER CHART :

| | | |
|---|---|---|
| **BCVA** | **:** | **Best corrected visual acuity** |
| **C** | **:** | **Conjunctival congestion** |
| **EYE OP** | **:** | **Eye Operated** |
| **F** | **:** | **Female** |
| **FB Sens** | **:** | **Foreign Body Sensation** |
| **GRAFT** | **:** | **Conjuctival Limbal Autograft** |
| **L** | **:** | **Left** |
| **LE** | **:** | **Left Eye** |
| **M** | **:** | **Male** |
| **MMC** | **:** | **Mitomycin C** |
| **PRE OP** | **:** | **Properative** |
| **POST OP** | **:** | **Postoperative** |
| **P** | **:** | **Pain** |
| **p** | **:** | **partial** |
| **PH** | **:** | **Photobia** |
| **R** | **:** | **Right** |
| **RE** | **:** | **Right Eye** |
| **REC** | **:** | **Recurrence** |
| **r** | **:** | **Redness** |
| **SCTH** | **:** | **Scleral Thinning** |
| **SBMPMC** | **:** | **Shri B. M. Patil medical college** |
| **VA** | **:** | **Visual Activity** |

# ANNUXURE – 2 : MASTER CHART

| Sl No | Name | Age | Sex | IP no | Hospital | Occupation | Symptoms | Duration | Morphology | Types | Eye | BCVA | | T | POR | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Pre op | Post op | | 1st Month | 6th month |
| 1) | Bibijan | 53 | F | 15435 | SBMPMC | Farmer | Cosmetic | 6 Months | L NASAL | II | L | 6/18 | 6/12p | GRAFT | P,r | - |
| 2) | Shrikanth wagamode | 65 | M | 16889 | SBMPMC | Farmer | Cosmetic | 12 Months | L NASAL | III | L | 6/18 | 6/18 | MMC | r | - |
| 3) | Shantabai | 53 | F | 16426 | SBMPMC | Housewife | FB sens | 8 Months | LNASAL | II | L | 6/12 | 6/12 | GRAFT | r, FB sens | |
| 4) | Sabu | 66 | M | 735 | SBMPMC | Farmer | Cosmetic | 9 Months | LNASAL | II | L | 6/18 | 6/18 | MMC | r | - |
| 5) | Noeelawwa | 45 | F | 1078 | SBMPMC | Housewife | Pain, FB sens | 10 Months | L.NASAL | II | L | 6/9 | 6/6p | GRAFT | - | - |
| 6) | Awwanna | 48 | M | 1442 | SBMPMC | Farmer | Cosmetic | 4 Months | R.NASAL | III | R | 6/12 | 6/9 | MMC | r | |
| 7) | Renuka | 31 | F | 2334 | SBMPMC | Tailor | FB sens | 5 Months | L.NASAL | II | L | 6/12 | 6/12 | GRAFT | FB sens | - |
| 8) | Shantamma | 35 | F | 2458 | SBMPMC | Housewife | Pain | 1 Month | R.NASAL | III | R | 6/9 | 6/9 | MMC | r | - |
| 9) | Basavaraj | 29 | M | 2634 | SBMPMC | Welder | Cosmetic | 2 Months | L.NASAL | III | L | 6/12 | 6/12 | GRAFT | - | - |
| 10) | Basavaraf | 29 | M | 2634 | SBMPMC | Welder | Pain | 3 Months | R.NASAL | II | R | 6/12 | 6/12 | MMC | - | - |
| 11) | Motibalchavan | 65 | F | 3669 | SBMPMC | Farmer | FB sens | 11 Months | R.NASAL | III | R | 6/18 | 6/12p | GRAFT | FB sens | - |
| 12) | Hanuman | 35 | M | 4410 | SBMPMC | Teacher | Cosmetic | 12 Months | L.NASAL | II | L | 6/9 | 6/9 | MMC | PH | - |
| 13) | Bagawant | 55 | M | 7039 | SBMPMC | Farmer | Pain | 2 Months | R.NASAL | II | R | 6/18 | 6/12 | GRAFT | - | C |
| 14) | Gurappa pujari | 38 | M | 8362 | SBMPMC | Farmer | FB sens | 1 Months | R.NASAL | II | R | 6/24 | 6/9 | MMC | PH | - |
| 15) | Shivalingawwa | 60 | F | 9908 | SBMPMC | Housewife | Cosmetic | 3 Months | L.NASAL | II | L | 6/24 | 6/9p | GRAFT | FB | - |
| 16) | Malanna | 40 | M | 16192 | SBMPMC | Farmer | Cosmetic | 4 Months | L.NASAL | II | L | 6/36 | 6/18 | MMC | PH | - |
| 17) | Siddu hiremath | 35 | M | 9417 | SBMPMC | Farmer | Pain | 6 Months | R.NASAL | III | R | 6/12 | 6/9p | GRAFT | PH | - |
| 18) | Siddu hiremath | 35 | M | 9417 | SBMPMC | Farmer | FB sens | 7 Months | L.NASAL | II | L | 6/24 | 6/18 | MMC | r | |
| 19) | Anilkumar | 35 | M | 10775 | SBMPMC | Farmer | Redness | 3 Months | R.NASAL | III | R | 6/12 | 6/9 | GRAFT | FB sens | REC |
| 20) | Channappa | 67 | M | 16311 | SBMPMC | Farmer | Redness | 7 Months | L.NASAL | II | L | 6/18 | 6/18 | MMC | r | - |
| 21) | Muttappa | 70 | M | 17031 | SBMPMC | Farmer | Cosmetic | 8 Months | L.NASAL | II | L | 6/60 | 6/36 | GRAFT | - | - |
| 22) | Somappa | 70 | M | 17323 | SBMPMC | Farmer | Redness | 1 Month | R.NASAL | III | R | 6/60 | 6/60 | MMC | P | - |
| 23) | Dundappa | 51 | M | 17602 | SBMPMC | Welder | Cosmetic | 2 Months | L.NASAL | II | L | 6/18 | 6/12 | GRAFT | - | C |
| 24) | Bhimappa | 58 | M | 17538 | SBMPMC | Farmer | Cosmetic | 3 Months | L.NASAL | II | L | 6/36 | 6/24 | MMC | PH | REC |
| 25) | Babu | 58 | M | 17888 | SBMPMC | Farmer | Cosmetic | 4 Months | R.NASAL | II | R | 6/18 | 6/18 | GRAFT | - | - |
| 26) | Janabai | 60 | F | 17988 | SBMPMC | Housewife | FB sens | 7 Months | R.NASAL | II | R | 6/24 | 6/18p | MMC | PH | - |
| 27) | Bhimappa | 60 | M | 18347 | SBMPMC | Farmer | Cosmetic | 8 Months | LNASAL | II | L | 6/36 | 6/18 | GRAFT | - | - |
| 28) | Siddram | 33 | M | 8889 | SBMPMC | Farmer | Pain, FB sens | 9 Months | LNASAL | II | L | 6/12p | 6/12 | MMC | PH | - |
| 29) | Ballakka | 60 | F | 19608 | SBMPMC | Housewife | Cosmetic | 1 Month | L.NASAL | II | L | 6/36 | 6/36 | GRAFT | - | C |
| 30) | Shabana | 45 | F | 2336 | SBMPMC | Farmer | FB sens | 6 Months | R.NASAL | II | R | 6/24 | 6/18p | MMC | - | C |
| 31) | Shaila | 46 | F | 4830 | SBMPMC | Farmer | Cosmetic | 4 Months | L.NASAL | III | L | 6/18 | 6/18 | GRAFT | - | - |
| 32) | Shaila | 46 | F | 4830 | SBMPMC | Farmer | Cosmetic | 5 Months | R.NASAL | II | R | 6/24 | 6/18 | MMC | P | C |
| 33) | Amarappa | 50 | M | 5194 | SBMPMC | Farmer | FB sens | 6 Months | L.SANAL | III | L | 6/12 | 6/9 | GRAFT | P | - |
| 34) | Ningawwa | 50 | F | 6805 | SBMPMC | Farmer | Pain | 7 Months | L.SANAL | II | L | 6/12 | 6/12 | MMC | PH | - |
| 35) | Doddappa | 55 | M | 6604 | SBMPMC | Farmer | Cosmetic | 8 Months | L.SANAL | II | L | 6/18 | 6/18 | GRAFT | PH | - |
| 36) | Kalavathi | 53 | F | 7356 | SBMPMC | Tailor | Pain | 9 Months | R.NASAL | II | R | 6/36 | 6/36 | MMC | PH | - |

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| 37) | Kalavathi | 60 | F | 8376 | SBMPMC | Farmer | FB sens | 8 Months | R.NASAL | II | R | 6/36 | 6/24 | GRAFT | - | C |
| 38) | Kamalabai | 50 | F | 8147 | SBMPMC | Housewife | Cosmetic | 2 Months | R.NASAL | II | R | 6/24 | 6/24 | MMC | P | SCTH |
| 39) | Rudrappa | 55 | M | 9122 | SBMPMC | Farmer | Cosmetic | 3 Months | R.NASAL | II | R | 6/18 | 6/18 | GRAFT | - | - |
| 40) | Iranna | 46 | M | 10150 | SBMPMC | Farmer | Pain | 6 Months | R.NASAL | II | R | 6/12 | 612 | MMC | PH | - |
| 41) | Parappa | 58 | M | 11760 | SBMPMC | Farmer | FB sens | 8 Months | L.SANAL | II | L | 6/12 | 6/6p | GRAFT | - | - |
| 42) | Mukthabai | 45 | F | 14955 | SBMPMC | Farmer | Redness | 6 Months | R.NASAL | II | R | 618 | 6/12 | MMC | PH | - |
| 43) | Rathanabai | 45 | F | 15452 | SBMPMC | Farmer | Redness | 7 Months | L.SANAL | II | L | 6/18 | 612 | GRAFT | - | - |
| 44) | Ramakanth | 56 | M | 16116 | SBMPMC | Farmer | Cosmetic | 8 Months | L.SANAL | II | L | 6/18 | 6/18 | MMC | PH | - |
| 45) | Lakshmibai | 60 | F | 18119 | SBMPMC | Farmer | Redness | 9 Months | R.NASAL | II | R | 6/60 | 6/60 | GRAFT | FB sens | - |